The town concerts and many places of interest were specially thrown open to members. The arrangement of meeting places in one or more *cafés* was another feature which added considerably to the social success of the meeting. Excursions were organised to the Stift Neuberg, to Speyer, and up the Neckar Valley.

Mathematicians who had known of one another for years as mere names have now become personal friends, and we shall carry away life-long reminiscences of the many pleasant meetings which have done much to cement the bond of union between fellow workers in all branches of mathematics, and of all nationalities. G. H. BRYAN.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—On Monday, August 22, the University of Cambridge conferred seventeen honorary degrees on the occasion of the meeting of the British Association. The following are the speeches delivered by the Public Orator, Dr. Sandys, of St. John's College, in presenting those of the recipients who received the degree of Doctor in Science for distinction in natural sciences, mathematics, or anthropology :—

OSKAR BACKLUND, PROFESSOR OF ASTRONOMY, ST. PETERSBURG.

Ab exteris exorsi, primum omnium salutamus nuntium quendam sidereum, ab arce illa celeberrima prope Petropolin stellis observandis dedicata ad nos devectum, quae trium deinceps Struviorum nominibus iamdudum gloriatur. Ipse talium virorum haeres dignissimus, planetarum potissimum in moles motusque perturbatos diligenter inquisivit, et Enckii praesertim cometen, ter in quoque decennio inter sidera nostra lucentem, indagandum sibi sumpsit. Dum cometae illius reditum in mense proximo spe certa expectamus, sideris illius indagatorem indefessum hodierni diei inter lumina libenter numeramus.

HENRI BECQUEREL, PROFESSOR OF PHYSICS, PARIS.

Francogallorum e republica vicina cursu prospero ad nos pervenit scientiarum Academiae Parisiensis socius illustris, cuius etiam patrem avumque honore eodem ornatos fuisse constat. Ipse in vi magnetica praesertim exploranda diu praeclare versatus, nuper propterea imprimis famam est adeptus, quod metallum, sideris Urani inventoris in honorem, olim Uranium nominatum, primus omnium nuper probavit ipsum radios quosdam mirabiles emittere, quos etiam per metalla transire non dubitare. Laetamur virum tam illustrem scientiae lumen, a patre suo sibi olim traditum, splendore novo a sese exauctum, etiam aliis invicem iamdudum tradere. Etenim, scientiae quoque in lumine vitali per saecula hominum tradendo,

"sic rerum summa novatur
semper, et inter se mortales mutua vivunt,...
et quasi cursores vitai lampada tradunt."

J. W. BRUEHL, PROFESSOR OF CHEMISTRY, HEIDELBERG.

Salutamus deinceps virum urbis Palatinae inter professores illustres iamdudum numeratum, virum in scientia chemica insignem. Ut rem scientiae illius ad historiam pertinentem paulo altius repetamus, inter physicos antiquos olim, uti nostis, finem secandis corporibus esse negavit quidem Anaxagoras, Democritus autem affirmavit; Democriti vero atomos, per duo milia annorum inutiles et infructuosas existimatas, scientiae chemicae saltem inter professores rursus in honore esse constat. Viri huiusce autem inter merita id potissimum commemoratur, quod, experimentis exquisitis iam per quattuor et viginti annos adhibitis, praeclare ostendit, quae potissimum inter res in unum revera compositas atque atomorum, rerum earum in particula quaque consociatarum, distributionem ratio intercedat. Unde fit, ut etiam in rebus perquam multiplici modo compositis, atomorum illarum nexus accuratius explicentur, atque etiam in coloribus quibusdam novis vetera illa Lucretii verba denuo vera reddita sint, quo docente rerum primordia

"variis sunt praedita formis,
e quibus omne genus gignunt variantque colores
propterea, magni refert quod semina quaeque
cum quibus et quali positura contineantur."

ADOLF ENGLER, PROFESSOR OF BOTANY, BERLIN.

Universitatis Berolinensis e professoribus praeclaris adest vir, qui arborum et herbarum provinciam eximiam iam per annos quadraginta luculenter illustravit. Hoc iubente, quot arborum genera conifera, quot liliorum varietates, quot dicotyledonum species obscurae, e tenebris in lucem novam surrexerunt! Idem (ne plura commemorem) etiam scientiae suae Acta a se condita iam per annos tres et viginti edidit, genera plantarum omnia in ordinem optimum reduxit, ne palaeontologiam quidem neglexit, neque Africam Orientalem neque Americam Australem inexploratam reliquit. Quod ad alios attinet, Victoris Hehnii librum celeberrimum de transitu plantarum ex Asia in Europam conscriptum accuratiorem reddidit, etiam plantarum per orbem terrarum distributionem Alexandri Humboldtii in memoriam prosecutus. In scientia botanica nemo fortasse hodie Plinii ipsius verba sibi verius potest arrogare :—"non unius terrae sed totius naturae interpretes sumus."

PAUL VON GROTH, PROFESSOR OF MINERALOGY, MUNICH.

Ex urbe pulcherrima, quod Bavariae totius caput est, ad nos pervenit vir studiorum in regione pulcherrima versatus, qui crystallorum scientiam physicam professus, Milleri nostri, viri insignis, crystallorum describendorum rationem et ipse praetulit et aliis omnibus per Europam totam commendavit. Quantum in scientia sua in ordinem redigenda atque etiam aliis tradenda profuerit, testantur Acta illa ab ipso condita et per annos plus quam quinque et viginti edita; testantur tot discipulorum et amicorum etiam inter exteros gratulationes recentissimae; testatur praeceptoris tanti in honorem imago ipsius arte eximia depicta et anni huius paulo ante Kalendas Maias donata; testatur hodiernus denique dies, quo nomen viri "quem rumor alba gemmeus vehit pinna," tituli nostri signo honorifico consignamus. Etiam hodierni diei memor, poterit fortasse Martialis verba mutuari :—

"Felix utraque lux, diesque nobis
Signandi melioribus lapillis."

ALBRECHT KOSSEL, PROFESSOR OF PHYSIOLOGY, HEIDELBERG.

Urbem Palatinam denuo in memoriam vocat physiologiae illius chemicae professor insignis, quae quicquid vivit perscrutata, tot corpuscula textu tenuissima explorat et explicat, tot cellulas absconditas in lucem protrahit et enucleat. Abhinc annos sex eiusdem Universitatis, eiusdem scientiae, professorem in hoc ipso loco laudavimus, qui in unoquoque e tribus decenniis hanc scientiam magnopere adiuvit. In professore illo laudando sperabamus intra proximum decennium fore ut talium virorum laboribus physiologiae in provincia chemica laurus plurimae referrentur. Quod illo die sperabamus professoris illius successor feliciter ratum effecit.

HENRY F. OSBORN, PROFESSOR OF ZOOLOGY, NEW YORK.

E republica maxima trans aequor Atlanticum diu prospere constituta laetamur ad nos advectum esse virum palaeontologiae praesertim in scientia insignem, qui non modo in Universitate Columbiana, nobis et linguae et studiorum communium societate coniunctissima, zoologiam praeclare profitetur, sed etiam, Eboraci Novi in Museo maximo, animalium ingentium e rupibus ipsis effossorum multitudinem saxeam, sive Dinosauri sive Atlantosauri nominantur, sive alio aliquo nomine splendido gloriantur, summa sollertia conquisivit, summa arte disposuit, summa cura custodit. Gaudemus rempublicam illam, tot rerum novarum varietate excellentem, etiam vitae pristinae vestigia tam antiqua tanta cum alacritate persequi. Iuvat virum hospitii iure cum plurimis coniunctum Ennii ipsius in verbis etiam propterea laudare, quod, in Museo illo "multa tenens antiqua," ipse "egregie cordatus homo" esse perhibetur.

VITO VOLTERRA, PROFESSOR OF APPLIED MATHEMATICS, ROME.

Quem genuit Ancona, quem arx antiqua Etruriae suo nomine ornavit, quem primum Pisarum, Galilei cum memoria consociatarum, deinde Augustae Taurinorum, denique Romae ipsius Universitas inter professores suos numeravit, multis profecto nominibus observantiae vestrae commendatur. Sed, ut relictis nominibus ad res ipsas progrediamur, inter peritos constat virum hunc lucis praesertim

in legibus investigandis esse imprimis illustrem atque scientiae dynamicae (ut aiunt) in ratione universa exploranda plurimum pollere. Viri Italiae totius inter mathematicos conspicui meritis accuratius explicandis gravamur prorsus imparem esse veterem illam linguam Latinam, quam ipsa Italia Britannis olim donavit. His saltem in studiis Italia hodierna Italiam antiquam superavit.

SIR DAVID GILL, K.C.B., F.R.S., H.M. ASTRONOMER AT THE CAPE.

Ad patriam reversi, quam libenter salutamus virum in stellis observandis insignem, qui inter Aberdonienses suos astronomiae studia olim auspicatus, planetae Veneris transitum in oceano Indico accurate observandum curavit. Idem et Aegypti et Africae Australis coloniae extremae et Terrae Natalis spatia ampla dimensus est; stellarum omnium imaginum lucis ipsius auxilio reddendarum auctor fuit assiduus; Africae denique in promontorio remotissimo arcem caelestem sibi creditam quinque et viginti per annos fortiter et feliciter occupavit. In excubiis illis patria procul tolerandis quam fortem ipsum, in alios quam generosum sese praestitit; aliorum labores quantis stimulis incitavit, ad exitum felicem perductos quanta benevolentia excepit! Viri talis sub auspiciis et unius e professoribus nostris sub praesidio pro scientiarum societate Britannica in annum proximum Bonae Spei in Promontorio bene nominato licet omnia fausta augurari.

A. W. HOWITT, F.G.S., HONORARY FELLOW OF THE ANTHROPOLOGICAL INSTITUTE, &c.

Australiae praesertim aborigines, in annos singulos ad minorem numerum redactos, nonnullis vero in locis prope funditus extinctos, simplicitatis pristinae mores antiquos diutissime conservasse constat. Hic autem, a collega optimo, Collegii vicini alumno adiutus, indigenarum illorum primum consuetudines nuptiales, deinde adulescentium initiationes, denique religionis rudimenta prima, diligenter investigavit, et prioris aevi memoriam evanescentem litterarum monumentis fideliter mandavit. Talium virorum laboribus historia, si non "magistra vitae," at certe "lux veritatis," "nuntia vetustatis," "vita memoriae" esse gloriatur.

SIR NORMAN LOCKYER, K.C.B., F.R.S., DIRECTOR OF THE SOLAR PHYSICS OBSERVATORY, SOUTH KENSINGTON.

Inter astronomiae et scientiae physicae fines patet provincia, ubi, instrumentis subtilissimis adhibitis, etiam solis ipsius radii retexuntur, et, linearum varietate quadam minutissima observata, corpora prima, e quibus sol ipse est compositus, inter sese distinguuntur. Adest vir in regione tam pulchra exploranda inter principes numeratus, qui, ne his quidem finibus contentus, non solis tantum defectus identidem observavit, sed etiam astronomiae provinciam amplissimam sibi vindicavit. Idem, per annos prope quinque et triginta Actis quibusdam praeclaris luculenter editis, anni cuiusque septimo quoque die rerum naturae totius varietatem orbi terrarum patefecit.

MAJOR P. A. MACMAHON, F.R.S., FORMERLY PROFESSOR OF PHYSICS AT THE ORDNANCE COLLEGE, WOOLWICH.

Adest deinceps militis insignis filius, miles mathematicis praesertim in studiis spectandus, qui praeter alios laudis titulos etiam scientiarum societatis Britannicae inter ministros praecipuos numeratur. Studiorum suorum in caelo puro, in regione illa sublimi a Cayleio nostro feliciter peragrata, diu versatus, studiis illis caelestibus sermonis Latini Musam pedestrem, longe infra in terris relictam, nihil aliud quam numerorum theoriam quandam e longinquo contemplari patitur. Cetera omnia scientiae tam sublimis mysteria, peritis patefacta, a nobis certe palam divulgari non concessum. Illud autem unum dixerim. Si, Syracusis captis, Archimedem, intentum formis, quas in pulvere illo erudito descripserat, Marcelli in exercitu miles talis aspexisset, caeli spectatorem illum unicum, tormentorum bellicorum machinatorem illum mirabilem, sine dubio nunquam interfecisset, sed velut socium et fratrem statim esset amplexus.

SIR WILLIAM RAMSAY, K.C.B., F.R.S., PROFESSOR OF CHEMISTRY AT UNIVERSITY COLLEGE, LONDON.

Virum inter Caledones suos atque inter Germanos educatum, titulo nostro Academico fortasse eo digniorem putabitis, quod iam in orbe terrarum toto Academiis fere viginti honoris causa est adscriptus. Per annos septemdecim inter Londinienses scientiam chemicam praeclare professus, aëris praesertim elementa exploravit, et (cum alumno nostro insigni, Rayleio, consociatus) elementum illud *Argon* nuncupatum repperisse confitetur. Etiam propterea laudandus est quod in metallis *Helium* invenit; quod in aëre ipso *Neon*, quod *Krypton*, quod *Xenon*, tot elementa ex ipsa rerum naturae origine latentia detexit, detecta nominibus pulchris, nominibus Graecis, ornavit. Nonnullis certe e nobis non ingratum, etiam in elementis novis nominandis linguae Graecae antiquae utilitatem comprobatam contemplari; iuvat etiam ipsius nomen gentile et olim et nuper propter linguarum peritiam inter Caledones celebratum, in rerum et nominum inventore tanto, etiam rerum naturae scientia illustratum admirari.

ARTHUR SCHUSTER, F.R.S., PROFESSOR OF PHYSICS IN THE VICTORIA UNIVERSITY OF MANCHESTER.

Virum libenter rursus agnoscimus, qui primum Moeni sui in ripa, deinde inter Mancunienses, denique in urbe Palatina educatus, inter nosmet ipsos et Maxwellii et Rayleii nostri inter adiutores praecipuos olim numerabatur. Postea solis defectioni in India trans Gangen observandae quondam praepositus, a societate regia ob lucis arcana feliciter explorata numismate aureo est donatus. Laetamur virum, qui fluminis paterni in ripa ad rem argentariam non sine lucro magno sese dedere potuisset, scientiae lucem lucro praetulisse et lucem ipsam explorandam elegisse. Virum talem dum coronat, Academia Virtutem ipsam aemulatur,

"diadema tutum
deferens uni propriamque laurum
quisquis ingentes oculo irretorto
spectat acervos."

SIR WILLIAM THISELTON-DYER, K.C.M.G., F.R.S., DIRECTOR OF THE ROYAL BOTANICAL GARDENS, KEW.

Laurea nostra iuvat hodie decorare virum Florae in studiis insignem, cuius socerum in eisdem studiis illustrem abhinc annos duodequadraginta Academia libenter ornavit. Isidis propter undas educatus, scientiam suam eximiam et in Anglia et in Hibernia professus, Tamesis in ripa, Florae in hortis pulcherrimis, iam per annos prope triginta vitae suae tabernaculum collocavit. Nomen autem eius non modo regionis Tamesinae sed etiam Africae Australis, Africae denique interioris, cum floribus consociatur. Satis amplus igitur laudandi campus patet, campus floribus consitus, omnique pulchritudinis varietate distinctus; sed Flora vocat, sed horti nostri vos invitant, sed oratorem vestrum, Maronis non immemorem, hortos canere volentem, temporis spatium excludit.

"Extremo ni iam sub fine laborum
vela traham et terris festinem advertere proram,
forsitan et pingues hortos quae cura colendi
ornaret canerem, biferique rosaria Paesti,...
verum haec ipse equidem, spatiis exclusus iniquis,
praetereo, atque aliis post me memoranda relinquo."

DR. J. LORRAIN SMITH, Musgrave professor of pathology at Queen's College, Belfast, has been appointed professor of pathology and pathological anatomy in the University of Manchester.

DR. JULES TANNERY, subdirector of the Paris École normale supérieure, has been appointed professor of differential and integral calculus, and Dr. Houssay professor of zoology in the faculty of science. These two appointments are consequent upon the inauguration of the new régime at the normal school, which has now been attached to the Sorbonne.

IN September, 1902, the Board of Education referred to the consultative committee the question of drafting regulations for the establishment of supplemental registers for teachers of special subjects. Acting upon the report of a subcommittee appointed to consider the subject, the Board of Education has announced that the establishment of supplemental registers will be postponed until the teaching

of the subjects proposed for the supplemental registers has been further organised in connection with general education.

THE Duke of Devonshire, on August 20, handed over from the trustees of the Keighley Mechanics' Institute to the Corporation of the town the title deeds of premises valued at more than 50,000*l.*, which the municipality is taking over. During the course of his speech on that occasion, the Duke of Devonshire referred to the work with which he has been associated as president of the National Association for the Promotion of Technical and Secondary Education. The association has pointed out that the industrial and commercial supremacy of our country, upon which its power and greatness mainly, if not entirely, depend—a supremacy which once was unquestioned and undisputed—is not unassailable and is not unassailed. Our former supremacy rested mainly, if not entirely, upon the possession of great natural resources, and upon the energy and industry of our people. These are not now the only, if they are the chief, elements in industrial success. The discoveries of science and the application of science to industries have revolutionised the conditions of industry. Other nations, among whom Germany and the United States have been foremost, but all other Continental nations—France, Italy, Switzerland, and others—have appeared to realise this fact sooner than we have done, and to make greater efforts, and more organised efforts, than we have done to give to all classes engaged in these industries the scientific instruction which is in the present day the necessary condition of success. There are signs that these efforts on their part, and on the part of other countries, and this comparative negligence on our part are already having effect, and it is incontrovertible that it must sooner or later have a vast effect prejudicial to our own commercial and industrial supremacy. It is now recognised that scientific instruction for the whole of our people is a necessary element to our industrial success. Cultivated brains are as essential to industrial efficiency as even the strongest arms or the most willing hearts. The duty of imparting this instruction to those who need it is one that can no longer be safely left to the efforts of the benevolent or the philanthropic, but is the duty of the State as much as that of national defence, the defence of our Imperial possessions, or the defence of our own shores.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 16.—"The Lethal Concentration of Acids and Bases in respect of *Paramoecium aurelia*." By J. O. Wakelin **Barratt.**

The author finds that the strong mineral acids, hydrochloric, nitric, and sulphuric, in 0·0001 N concentration kill Paramœcia in ten to fifty minutes. Organic acids, in the same concentration, kill sometimes with greater rapidity (formic, lactic, and oxalic acids), sometimes with less rapidity (citric and acetic acids). Exceedingly weak acids (carbonic, carbolic, boric, hydrocyanic) require a much greater concentration in order to kill Paramœcia in the above period of time.

The hydrates of potassium, sodium, lithium, calcium, strontium, and barium in 0·002 N concentration are fatal in five to sixty minutes. Ammonium hydrate is more lethal, and far more so is the extremely weak base anilin. The lethal character of the alkalis exhibits an order corresponding to their periodic grouping.

The experiments made indicate that the action of acids and alkalis upon the living protoplasm of Paramœcia is of the nature of a chemical reaction, and is not purely hydrolytic in character.

PARIS.

Academy of Sciences, August 16.—M. Mascart in the chair.—The second approximation to the equation for the flow of sheets of underground water under slight pressures: J. **Boussinesq.**—New researches on the liquefaction of helium: Sir James **Dewar.** A side tube containing charcoal is added to a vacuum tube, and the tube filled with helium. When the charcoal is cooled down by means of liquid hydrogen to 15° C. absolute temperature, the vacuum produced is so good that a coil giving a 16-incn spark in air is required to produce a slight phosphorescent discharge in the middle of the tube. It follows that at this low temperature the charcoal is a good absorbent of helium. These experiments are regarded as confirming the conclusion that the boiling point of helium will not be found to be below 5° C. absolute.—On a crystalline combination of the acetate and thiosulphate of lead, $2PbS_2O_3,(CH_3—CO_2)_2Pb$: P. **Lemoult.** This compound is precipitated from a solution of lead acetate to which some sodium thiosulphate has been added, and the precipitate of lead thiosulphate re-dissolved by the addition of acetic acid. The above formula was established by analysis.—The alloys of zinc and magnesium: O. **Boudouard.** A series of alloys was prepared containing from 5 per cent. to 90 per cent. of magnesium, the melting points of which were determined. The melting point curve showed a maximum and two minima. The maximum corresponded to a definite combination, Zn_2Mg, and the microscopic study of a polished section proved the existence of a second definite compound, $ZnMg_4$. Both these alloys were isolated.—The properties and constitution of chrome steels: Léon **Guillet.** Two series of chrome steels were studied, both by micrography and by mechanical tests. One series contained very little carbon, the other 0·85 per cent. The steels studied were found to fall into four classes, and the limitations to their practical use are given.—On the evolution of structure in metals: G. **Cartaud.** A micrographic study of the crystallisation of lead.—The first stages in the development of *Sacculina carcini*: Paul **Abric.**—On the comparative values of the tissues of the tail from the point of view of regeneration in the larvæ of Alytes, and on the possible absence of this regeneration: P. **Wintrebert.**—The geology of Chabrières (Hautes-Alpes): E. A. **Martel.**

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